1.0 Phase I Accreditation Support Package Description

Phase I accreditation support activity is geared toward characterizing a model. For example, how is the model managed and supported? What studies has it supported, and was it accredited? What is its verification and validation (V&V) history? How well is it documented? What is the quality of the software? What are the model's known assumptions, limitations and errors? The end result of Phase I efforts should be generation of enough information that an initial determination of the suitability of a model for a particular purpose can be made. Phase I activities are identified in figure 1.0-1 below.
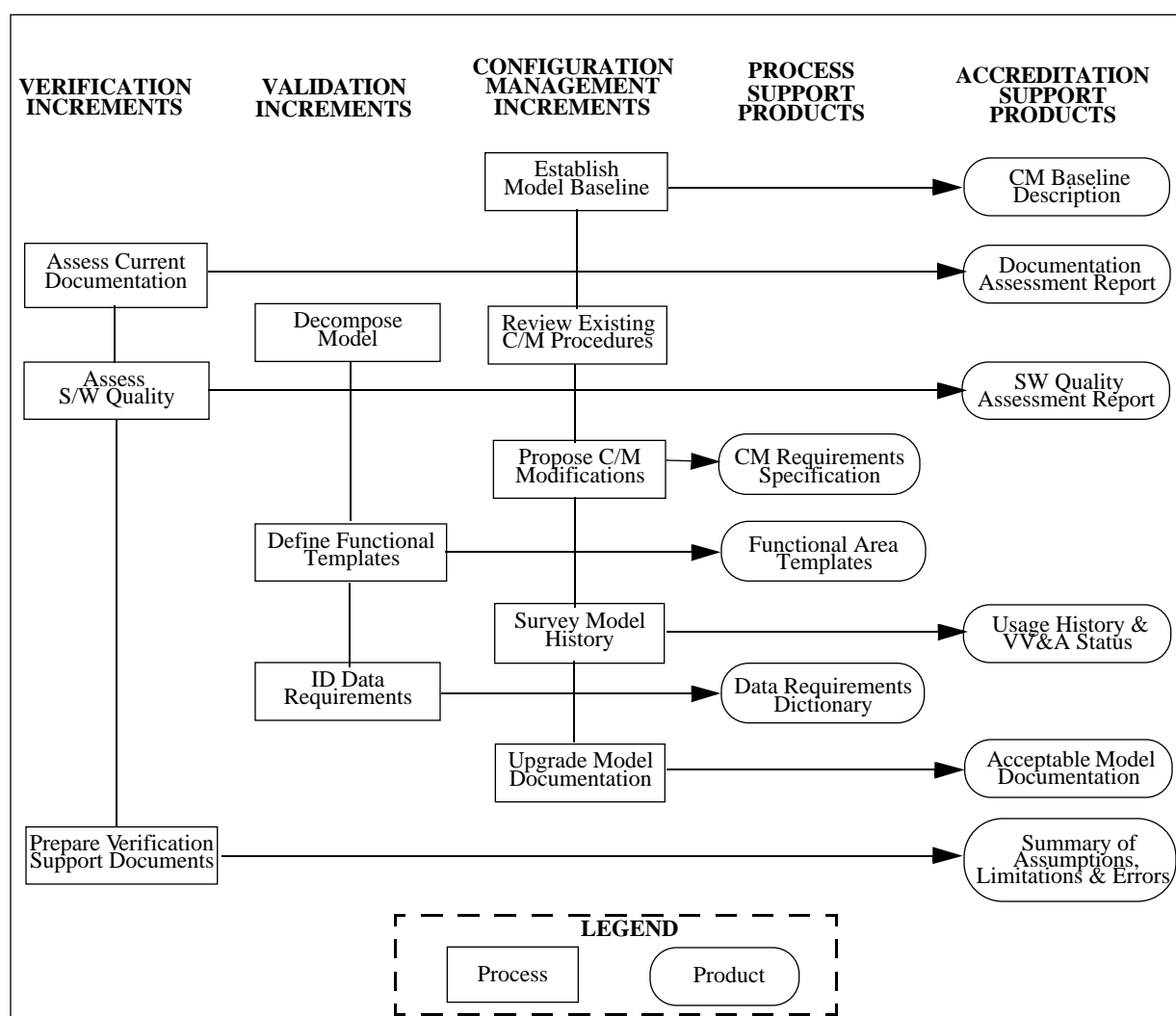

Figure 1.0-1   Phase I Accreditation Support Activities

Phase I accreditation support is comprised of five distinct V&V activities: definition of a model's configuration management baseline; summarization of the model's assumptions, limitations and

errors; determination of the model's V&V status and usage history; assessment of available documentation; and assessment of the quality of the model's software. Each of these activities is described in greater detail below.

1.1 Configuration Management Baseline

The configuration management (CM) baseline description for a model provides prospective users with an indication of how well the model is controlled and supported. Models with poorly defined configurations and unspecified (or vague) change control procedures are likely to produce inconsistent results across the spectrum of users and applications, with the consequence that model predictions will not be highly regarded. Models whose configurations are clearly specified, and whose change procedures are well disciplined are more likely to have timely supporting documentation and to produce consistent, accepted results. Moreover, well managed models have a lower risk of failing detailed V&V aimed at higher levels of accreditation.

The CM baseline for a model consists of a description of the model, its development history, current version status (including documentation), applicable change procedures, model development policy (including beta site version integration), and any configuration management policies, procedures, guidelines and support functions in place for the model. Taken as a whole, these information elements provide the prospective user with a vantage point from which to assess the discipline with which a model has been developed, the important operational differences between extant versions, and the potential impact of model management discipline on the acceptability of model results. As such, CM baseline information is essential to the basic choice of a model for further V&V or accreditation for a specific application. The CM baseline for ALARM is found in Section 2.

1.2 Summary of Assumptions, Limitations and Errors

Different users typically have different applications for the same model; each application will require that the model have certain characteristics. The purpose of this section of ASP I is to help the user determine, at an early stage, whether or not the model's assumptions, limitations and errors place it outside the realm of applicability to the problem at hand. Coupled with the model's usage history, the summary of assumptions, limitations and errors can be a powerful model selection tool. A summary of assumptions, limitations, and errors for ALARM is provided in Section 3.

1.3 V&V Status and Usage History

This section conveys to the prospective model user a sense of community acceptance of model results. The tacit assumption is that if a model is widely used, it represents a de facto community standard for the subject being modeled. A model's usage history also provides important clues to the possible limitations on model use. For example, if a model purports to simulate both RF and IR missile threats, but the user community consistently ignores the IR portion of the model, the model's usage history will suggest that this portion of the model is not trusted, or requires modification. This fact alone is not sufficient to judge a model truly acceptable for a given purpose, however.

Supporting evidence for model acceptability is given by a documented V&V audit trail, indicating that the user community has enough interest in the model to conduct such efforts. Evidence for such activity may be sparse, however, given that emphasis on V&V as part of the model credibility problem is of recent vintage. It is possible, therefore, that the primary criterion by which a prospective user will judge the suitability of the model for a particular application will be community acceptance, as indicated by the model's usage history. As V&V becomes *de rigeur* for modeling and simulation (M&S), the range of applications for which model results are supported by V&V will become broader, offering a clearer picture of the degree to which model results can be trusted. Information on the V&V status and usage history of ALARM can be found in Section 4.

1.4 Documentation Assessment

This section reviews the current status of a model's documentation with respect to standards developed for the verification of mature M&S. The standards were developed by reviewing MIL-STD, DoD-STD, JTCG/AS and service-specific policies, procedures and guidelines relating to M&S development, and tailoring these standards to the problem of "V&V in reverse" for mature M&S. The results are set forth in the *Software Verification Requirements Study Report* [9] and *Documentation Assessment Report for ESAMS, ALARM, and RADGUNS* [10]*,* which specify the number, format and content of a minimum documentation set acceptable for rational use of model results, and efficient conduct of verification and validation.

In general, a well-documented model will be supported by a documentation set consisting of a User's Manual, a Programmer's Manual, an Analyst's Manual, and a Software Design Document (or its equivalent). The documentation assessment task reviews each available component of model documentation for completeness and compliance with the recommended standards. Discrepancies are noted, implications for model use and V&V are summarized, and recommendations for improvement of the documentation are provided. A summary of the documentation assessment conducted for ALARM is in Section 5.

1.5 Software Quality Assessment

This section gives the prospective model user an indication of the conformance of model code to accepted software development and documentation practices. The structure of the source code of a given model is analyzed from a software engineering perspective in three major areas: use of programming standards, computational efficiency, and memory utilization. Within each of these major areas are several contributing factors which are individually evaluated and aggregated into a "score" representing an overall evaluation of source code quality.

Software quality assessment is no substitute for actual model experience and application as developed by a model's user community. It does, however, focus the user community on clearly identifiable software problems in a structured way, and gives the prospective model user information about the trade-off between software "maturity" and credible model use. The results of a software quality assessment of ALARM can be found in Section 6.